

**RESEARCH CALL TO ALL FEDERALLY FUNDED RESEARCH AND
DEVELOPMENT CENTERS**



**RESEARCH AND DEVELOPMENT ACTIVITIES TO SUPPORT
SOLID-STATE LIGHTING CORE TECHNOLOGIES**

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ISSUE DATE: May 16, 2007
MODIFIED: May 30, 2007
DUE DATE: July 10, 2007

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SECTION I – GENERAL INFORMATION

1.0 SUMMARY

The Department of Energy (DOE), National Energy Technology Laboratory (NETL), on behalf of the Office of Energy Efficiency and Renewable Energy's (EERE) Building Technologies (BT) Program, is seeking applications for applied research in the Solid- State Lighting (SSL) Core Technologies Program.

DOE has set aggressive and ambitious goals for SSL Research and Development (R&D): By 2025, to develop advanced solid-state lighting technologies that, compared to conventional lighting technologies, are much more energy efficient, longer lasting, and cost-competitive. The focus of this Research Call, is to support applied research in certain key technical areas by fostering a collaborative atmosphere favorable to overcoming the significant technical challenges that restrict the application of SSL today to only relatively low luminous output products.

Significant progress has been made in the performance of solid state lighting. Products are just now reaching the lighting market. However, these products have yet to reach the full potential of solid state lighting. Significant technical challenges still remain to the adoption of viable SSL. The technical challenges that impede penetration into mainstream general illumination markets are complex and require the combined resources of many researchers and perhaps, the unique research tools found only at a limited number of universities, Federally Funded Research and Development Centers (FFRDC) and research institutions. It may be difficult to overcome these critical technical challenges without a focused Government initiative. Partly, this is because this research may be judged too risky for industry to undertake alone. Thus, the collaborations sought under this Research Call will “buy down” or reduce the level of technical risk by providing significant financial resources.

An accompanying product funding opportunity announcement, to follow this Research Call, will solicit applications from interested companies (or teams of companies) for product development. Product applications will systematically use the knowledge gained from basic or applied research to develop or improve commercially viable materials, devices, or systems.

B. BACKGROUND INFORMATION

The lighting industry is nearly 100 years old and is often characterized as a mature industry. The DOE's BT Program selected lighting as one of the principle target markets for the development of more efficient technologies since it represents one-fifth of the national electrical consumption. The DOE has provided assistance over the past several years with significant effort invested by industry, academia and Government; the prevailing theme that has surfaced repeatedly is that the promise of solid-state lighting will only be produced through a focused and concentrated effort between the stakeholders.

Today, the lighting industry in North America is worth approximately \$12.7 Billion in sales annually. Of this amount, approximately \$3.3 Billion is associated with lamps while the remaining sales are divided up between fixtures, components (including ballasts and controls) and services such as design and maintenance. High brightness Light Emitting Diode (LED) sales, a popular product thought by many to be the nearest term solution to SSL, is a \$1 to \$2 Billion business with exponential growth prospects.

To address these issues and to advance energy conservation in lighting in US buildings, the DOE's BT Program maintains a Lighting Research and Development (LR&D) program. Key to achieving the objectives of this program is its mission statement.

To insure that its research portfolio meets critical and evolving needs in a timely fashion, the LR&D program has hosted and continues to host industry-led efforts to develop and maintain a series of technology road maps for the various technologies that comprise the lighting business. While not the only lighting technology of interest within the BT Program portfolio, SSL is the singular focus of this Research Call.

The SSL portfolio has developed a specific statement of objectives tailored to the aggressive needs suitable for general illumination applications. It targets aggressive performance goals that, if met and successfully deployed into the marketplace, will achieve the energy conservation goals of the LR&D program while meeting or exceeding the performance attributes of electric light that allows for direct comparison to natural sunlight spectra.

This Research Call is the fourth in a series of Research Calls that may span the next decade. As the relevant SSL technology base matures, it is anticipated that the level of technology maturation will advance from the present level, applied research, to market conditioning once the targets for efficiency, cost, longevity, stability and control are demonstrated in a product environment.

The DOE envisions a LR&D Program that works together with the SSL industry to meet the program's goal by the year 2025. Critical to this LR&D Program are seven important aspects:

- Emphasize Competition
- Cost (and Risk) Sharing
- Partners Involved in Planning and Funding
- Targeted Research for Focused Need
- Innovative Intellectual Property Provisions
- Open Information and Process
- Success Determined by Milestones Met and Ultimately Energy Efficient, Long-life and Cost competitive Products Developed

In order to achieve these goals a partnership was awarded via Memorandum of Agreement (MOA) to the Next Generation Lighting Industry Alliance (NGLIA). The purpose of the NGLIA is to provide input and prioritization of the core technology needs, provide administrative expertise and staffing to organize and conduct technical meetings and workshops, and support demonstrations of SSL technologies, among others.

Additionally, the SSL program has implemented innovative Intellectual Property provisions. This program has been granted an exceptional circumstances determination under the Bayh-Dole Act. The exceptional circumstances determination applies to awards under the Core Technologies Program and is expected to stimulate commercial utilization of new technology developed by Core awardees. The Core Technology Program participants will also benefit by having a ready set of potential licensees to which to license their invention(s), and, if the SSL Partnership members are successful in commercializing their lighting systems, may reap income in the form of royalties. The determination also requires substantial manufacturing in the US of products embodying new inventions. More detailed information about the Exceptional Circumstances Determination can be found at:

http://www.netl.doe.gov/ssl/PDFs/SSL%20Determination%20-%20Signed%20June%202005_1.pdf.

C. RESEARCH CALL OBJECTIVES

The focus of this Research Call is to insure that the LR&D portfolio of SSL technology sufficiently addresses the Core Technologies that can be readily and widely applied to existing and future lighting

products, which in turn will be energy efficient and cost competitive. It is in this collaborative atmosphere that applications are sought; applications that are truly innovative and groundbreaking, fill technology gaps, provide enabling knowledge or data, and will represent a significant advancement in the SSL technology base.

Core Technology Research will provide the focused applied research needed to advance SSL technology research that is typically longer-term in nature and not the focus of sustained industry investment. Through this Research Call, the DOE will fund research efforts at any Federally Funded Research and Development Center.

Of specific interest to this Research Call is the application of specialized tools and equipment, unique to a FFRDC, to the field of solid-state lighting. FFRDCs, by nature of their history and funding mechanisms, have specialized, unique, expensive equipment that does not exist anywhere else. This equipment may provide critical research or capability to the DOE SSL program. FFRDC applicants to this Research Call should highlight their unique capabilities for research in the following Areas of Interest.

D. PROGRAM AREAS OF INTEREST

The Program Areas of Interest for this Research Call were chosen based on research areas identified at the DOE SSL Workshop in February 2007, the recently updated DOE Multi-Year Program Plan, and the status of the DOE project portfolio. The complete report from the DOE SSL Workshops, Multi-Year Program Plan, and the DOE SSL project portfolio are available at www.netl.doe.gov/ssl/. The Areas of Interest target innovations in both Light Emitting Diodes (LED) and Organic Light Emitting Diodes (OLED). Each application should feature a single approach to achieve the desired performance improvements. Multiple approaches may be submitted in separate applications. Descriptive information on each of these Areas of Interest is provided in the following paragraphs:

Light Emitting Diodes (LED)

The LED Areas of Interest for this Research Call address four separate ways to enhance device efficiency and increase performance. Improved device efficiency is the primary goal of research in the LED area, but performance, cost, and manufacturability should be addressed in the application as well. All applications should refer to previous research that provides the rationale for initiating the proposed work.

Area of Interest 1: *Internal Quantum Efficiency (IQE) – Subtask 1.1.2* **(DE-PS26-07NT43130-01)**

In order to meet the DOE luminous efficacy goals by 2015, more research is required in the area of internal quantum efficiency (IQE) of LED devices. The DOE goal for red, green and blue LEDs is 90% IQE by 2015. Research in IQE benefits both color mixing and phosphor converted LED white-light system approaches. Improvements in the IQE across the visible spectrum will improve the efficiency and color rendering for the color mixed approach. Whereas, enhancing the IQE in blue, violet, and near ultra-violet spectrum will improve the efficiency for the phosphor converted approach. Research is solicited for the improvement in the IQE of LEDs that emit light at wavelengths between 380 nm and 600 nm. Applications are sought that specifically address the improvement of IQE through the epitaxial process. This includes, but is not limited to, bandgap engineering of the active region, novel growth structures, quaternary materials, novel alloys, the use of nanostructures within the active region, epitaxial growth of alternative crystal orientations, and study/control of the role of indium in the active region. Successful applicants must address IQE improvements beyond the current levels in solid-state lighting, which are 20% for Green and 60% for Blue. Preference will be given to projects that demonstrate the highest potential for improvement from current levels. IQE targets for a three year project should exceed 40% for

Green, and 70-80% for Blue LEDs. Demonstrable and quantifiable improvements in the IQE are suggested milestones for proposals to this approach.

Area of Interest 2: Reliability and Defect Physics for Improved Emitter Lifetime and Efficiency – Subtask 1.1.3 (DE-PS26-07NT43130-02)

LED crystal defects in the epitaxial material adversely affect the device lifetime and performance at high current density. Applications are sought that address defect reduction and/or mitigation in the epitaxial process. This research includes, but is not limited to, novel growth structures, improved epitaxial growth processes, studies in defect and dopant physics, and studies in the mitigation of defects at high current operation of LEDs. An additional avenue for research in this Area is low cost, high quality, substrates which should provide for a reduction in defect density in the epitaxial devices. Demonstrable and quantifiable reduction of defect density, reduction in device efficiency roll-off at high current operation, and improvement of IQE, especially at high current densities, are suggested milestones for the proposed projects to this Area. Research in this area should be working toward the 2015 goal of 150 lm/W at 150 A/cm².

Area of Interest 3: Phosphors and Conversion Materials – Subtasks 1.3.1 (DE-PS26-07NT43130-03)

Current high efficiency LEDs use a phosphor converted approach employing a high efficiency blue emitter with an efficient, broad emission yellow-green phosphor to create white light. Research is sought in improvements to quantum yield of blue or near UV pumped phosphors (wavelength conversion materials) emitting across the visible spectrum. Research is also sought in improvement of the optical efficiency of the phosphor system. Improvements in these areas will allow for higher efficiency and improved color rendition from phosphor converted LEDs. Phosphor stability and device color stability should also be addressed in the proposed research. Quantifiable improvements in the phosphor system efficiency should be the primary objective of this research, but spectral power distribution, CRI and color stability are also suggested milestones for this research. Research in this area should be working toward the 2015 goal of 90% QY across the visible spectrum.

Area of Interest 4: Extraction Efficiency – Subtask 1.2.2 (DE-PS26-07NT43130-04)

Extraction Efficiency of LEDs has been improving through the use of surface roughening, device thinning and other techniques. However the next technological leap needs to be made in order to achieve the DOE goal of 90% extraction efficiency before 2015. Applications are being sought to improve extraction efficiency of LEDs at the chip and packaging levels. This research includes, but is not limited to surface roughening/patterning, device thinning, chip shaping, reflective coatings, reflector designs, index matched materials, and photonic crystals. Current state of the art device extraction efficiency is around 60%. Applicants should propose to demonstrate extraction efficiency improvements compatible with high brightness LEDs beyond current state of the art. Improvements in extraction efficiency should be listed as milestones in the application.

Organic Light Emitting Diodes (OLED)

There are two OLED Areas of Interest for this Research Call. It is recognized that OLED performance is based on a complex relationship between choice of substrate, transparent conductor, light emitting materials, conductive and blocking materials, electrode materials, and encapsulants. Enhancements in one technological area should not come at the expense of overall device performance. To this point, multiple areas of interest may be addressed in a single application. The primary objective of all proposed OLED

research should be improved device efficiency with secondary objectives of improved device stability, luminance, and cost.

Area of Interest 5: *Organic Light Emitter Research - High efficiency, low voltage, high luminance, stable materials and structures – Subtasks 3.1.2, 3.1.3 and 3.2.2*
(DE-PS26-07NT43130-05)

This Research Call is seeking research in the development of materials that will efficiently emit light, operate at a low voltage, show improvements in operating lifetime, and operate at increased brightness levels. This research includes, but is not limited to improved carrier transport materials, carrier blocking materials, integrated nano-structures, inorganic-organic hybrid materials, doping, improved anode and cathode designs, and charge balancing techniques. Improvements made in device efficacy should not come at the expense of device stability or brightness. Applications to this area should also consider manufacturability and cost of fabrication in their application. The applications in this area should build upon prior research which will now be applied to the field of OLEDs for solid-state lighting. Applications should contain milestones with measurable improvements in device efficiency, increased luminance and improved device lifetimes.

Area of Interest 6: *Strategies for improved light extraction of OLEDs – Subtask 3.2.1*
(DE-PS26-07NT43130-06)

Vast improvements have been made recently in the extraction efficiency of LEDs. However, corresponding advancements have not yet been fully applied to OLED devices. This Research Call is seeking research into optical device design for improved light extraction, while maintaining, or improving, device stability and device cost. OLED devices have the possibility of using unique geometries or structures, unavailable to their inorganic LED counterparts, to enhance light extraction efficiency which have not been fully explored. Advancements to extraction efficiency in existing state of the art OLED devices may provide the final necessary enhancement to allow for the competitive performance of these devices. Suggested milestones for this research are enhancements to extraction efficiency, overall device efficiency, and device stability.

SECTION II: REQUIREMENTS AND ELIGIBILITY

1.0 ELIGIBLE APPLICANTS

All Federally Funded Research and Development Centers (FFRDC) are encouraged to submit proposals in response to this Research Call. For-profit, non-profit, state and local governments, Indian Tribes, and institutions of higher education are not eligible for this Research Call, but are encouraged to submit proposals to the companion Funding Opportunity Announcement DE-PS26-07NT43130. All proposed team members must accept the Exceptional Circumstances language found in Section II Part 7.0. Teaming with other FFRDCs is acceptable if this teaming leads to a greater likelihood of achieving the goals of the SSL program in a timely fashion. Industry and Universities are excluded from participating as subcontractors unless they are providing some sort of general service as opposed to research.

2.0 TYPE OF AWARD INSTRUMENT

Any project awarded as a result of the Research Call will be processed through the NETL Financial Management Office as a Field Work Proposal, an Interoffice Work Order or any other allowable method deemed appropriate by the Government.

3.0 ESTIMATED FUNDING

Approximately \$3.75 million dollars is expected to be available for new awards under this Research Call, funded over multiple government fiscal years.

4.0 EXPECTED NUMBER OF AWARDS

DOE anticipates making approximately 2-5 awards this fiscal year under this Research Call. However, the Government reserves the right to fund, in whole or in part, any, all, or none of the proposals submitted in response to this Research Call and will award that number of instruments which serves the public purpose and is in the best interest of the Government. In addition, the Government reserves the right to make “conditional selections” in the event that future funding should become available.

5.0 ESTIMATED AWARD SIZE

DOE anticipates that awards will not exceed the amount set forth below. However, applicants are not encouraged to try to equal these estimates but should offer logical work plans and appropriate costs:

Project Period Length	Maximum Federal Share
12 months	\$ 600,000
12 - 24 months	\$1,200,000
24 – 36 months	\$1,800,000

This information is for estimating purposes only and in no way commits the Government.

6.0 PERIOD OF PERFORMANCE

DOE anticipates making awards that will range from twelve (12) months to thirty-six (36) months. Awards will have project and budget periods that are specific to the project and funding.

7.0 EXCEPTIONAL CIRCUMSTANCES

Regarding any award made to a FFRDC under this Research Call, the Department of Energy has approved a determination titled “Exceptional Circumstances Determination for Inventions Arising Under the Solid-State Lighting Core Technologies Program.” This Determination is based on the Department’s belief that circumstances surrounding the Solid-State Lighting Core Technologies Program are exceptional and justify modified intellectual property arrangements as allowed by the Bayh-Dole Act (35 U.S.C. 202(a)(ii)). More detailed information about the Exceptional Circumstances Determination can be found at http://www.netl.doe.gov/ssl/PDFs/SSL%20Determination%20-%20Signed%20June%202005_1.pdf

The Department of Energy intends that disposition of rights to subject inventions made by a FFRDC under awards resulting from this Research Call will be subject to the terms of this Determination. The restriction of patent rights under the Determination will be basically as described in the following paragraph. The Department is requiring minimum licensing rights that the Core Technology Program recipients will have to agree to. Under 35 U.S.C. § 203(2), an awardee adversely affected by this exceptional circumstance determination has a right to appeal the determination to the Department of Energy or to the United States Court of Federal Claims.

All recipients under this Research Call shall be required to offer to each member of the Solid-state Lighting Partnership (i.e., the Next Generation Lighting Industry Alliance (NGLIA)) the option to enter into a non-exclusive license in the field of solid-state lighting applications for subject inventions

developed under the Core Technologies Program. Such licenses shall be granted upon terms that are reasonable under the circumstances, including royalties. This option shall only be available to NGLIA members and must be kept available for one year after the U.S. patent issues. After this one-year period, the Core recipient will be free from the licensing restrictions. The Core recipient must agree to negotiate in good faith with any and all NGLIA members that indicate a desire to obtain at least a non-exclusive license. Exclusive licensing may be considered if only one NGLIA member expresses an interest in licensing the invention. Partially exclusive licenses in a defined field of use may be granted to a NGLIA member, provided such license would not preclude any other NGLIA member that indicates a desire to license the invention from being granted at least a non-exclusive license. In the event the Core Recipient and a NGLIA member cannot reach agreement after nine months from the start of diligent and responsible negotiations between them, the NGLIA member shall have the right of a third party beneficiary to maintain an action in a court of competent jurisdiction to force licensing of the subject invention on reasonable terms and conditions. The licensing of any background patents owned by the Core recipient is not required.

SECTION III: SUBMISSION INSTRUCTIONS

1.0 SUBMISSION INSTRUCTIONS

Proposals shall be submitted electronically to the following email address **no later than July 10, 2007 at 11:59:59 PM Eastern Time**:

Brian Dotson, Project Manager
US Department of Energy
National Energy Technology Laboratory
Brian.Dotson@netl.doe.gov

The applicant is encouraged to request a return notification to verify receipt of proposal.

2.0 LATE APPLICATIONS, AMENDMENTS AND WITHDRAWALS OF PROPOSALS

A proposal or amendment of a proposal shall be considered timely if it is received on or before the closing date indicated above. Proposals or amendments of proposals may be withdrawn by written notice from an authorized representative to the above address via e-mail or in writing.

A second proposal or amendment may then be submitted. The second or subsequent proposal must be submitted before the closing date to be considered. In the event that two or more proposals are received for the same project with the same title, the proposal with the latest postmark will be considered for review. Therefore, it is important that you not merely make page changes and re-submit portions of the proposal that are amended. A complete amended proposal must be sent.

Proposals or amendments received after the closing date will not be considered.

SECTION IV: APPLICATION PREPARATION

1.0 PREPARATION

It is requested that the entire proposal not exceed twenty-five (25) pages, single spaced, 1" margins (top, bottom, left, right), and when printed will fit on size 8 1/2" by 11" paper. The type must be legible and not smaller than 11 point. The Technical Content (see Section IV Part 2.4) shall not exceed twenty (20) pages of the total page limit. Evaluators will review only the number of pages specified. Any proposals exceeding these limitations may result in a weakness to their overall scored based on technical evaluation Criterion 3 – Applicant and Team Member Roles & Capabilities. In order to produce a comprehensive application for this Research Call, the offeror shall address, at a minimum, the areas listed in the Table of Contents, below. The offeror shall use the following Table of Contents:

Section	Page
Field Work Proposal Cover Sheet	i
Public Abstract	ii
Table of Contents	iii
List of Tables	Iv
List of Figures	v
List of Acronyms	vi
Detailed Cost Analysis	vii
Technical Content	#
Technical Approach	#
Technology Value	#
Applicant and Team Members Roles and Capabilities	#
Previous or On-going Related Work	#
Appendices	#
Statement of Work (SOW)	A
Resumes of Key/Critical Personnel	B
Qualifications and Experience of Participating Organization(s)	C

2.1 FIELD WORK PROPOSAL COVER SHEET

The form must be completed and signed by an official who is authorized to act for the applicant and project team members (other FFRDCs) and who can commit the applicant to comply with the terms and conditions of award, if one is issued.

2.2 PUBLIC ABSTRACT

This section shall contain a public abstract of not more than one (1) typewritten page. The offeror shall provide a point of contact for coordination, preparation and distribution of press releases. The public abstract shall not contain confidential, proprietary, or otherwise sensitive information as it may be released by the DOE to the general public at any time.

2.3 DETAILED COST ANALYSIS

The applicant shall provide detailed cost information pertaining to their proposal. At a minimum, the cost analysis shall provide information regarding personnel costs, overheads, travel, equipment, and supplies. Include a supplemental schedule that identifies the labor hours, labor rates, and cost by labor classification for each budget year. Also indicate the basis of the labor classification, number of hours, and labor rates.

2.4 TECHNICAL CONTENT

Begin this section by stating the project objectives and provide a clear description of the work to be done. To facilitate the review process and insure maximum consideration, the applicant should address each of the criterion below and provide all of the requested information. These elements are consistent with the technical evaluation criteria in part V of this Research Call. Sufficient information should be provided to enable the reviewers to evaluate the application in accordance with these elements.

2.4.1. Technical Approach

- 1.1. Provide a clear and concise statement of the scientific merits and likelihood of success of the proposed approach. Explain any areas of technical uncertainty and the basis for the approach selected.
- 1.2. Include a table of milestones for each interval of the proposed effort. Be quantitative and descriptive. Typically, projects contain one to four milestones which may be accomplished in no longer than 18 months. These milestones should relate to the determination of technical “value” as described in Criterion 2.
- 1.3. Provide a succinct Statement of Work (SOW) as described below followed by an expanded discussion of technical approach. Provide a discussion of anticipated outcomes and results.
- 1.4. Provide an innovative and novel technical approach to achieving the stated objectives. Do not duplicate or elaborate on previous or ongoing research unless a significant new or enabling development has occurred. For a list of previous and ongoing work, please refer to the SSL Portfolio at <http://www.netl.doe.gov/ssl/project.html>.

2.4.2. Technology “Value”

- 2.1. Provide a discussion of how the proposed subject and approach will impact the eventual achievement of the DOE SSL mission/goal as contained in Part I of this Research Call.
- 2.2. Compare the performance of the proposed approach to current SSL device technology in terms of efficiency and discuss the likelihood of exceeding current SSL performance levels.
- 2.3. Explain how the proposed approach is applicable to multiple SSL technologies or may impact other DOE energy efficiency objectives (crosscutting).
- 2.4. Provide calculations of estimated efficiency benefits compared to current SSL technology and conventional lighting technology, if applicable. Provide baseline information upon which efficiency calculations are based.
- 2.5. Explain how the proposed research will allow the DOE to achieve their SSL goals earlier than planned. Be quantitative and estimate the impact this achievement might have on cumulative lighting energy conservation.

2.4.3. Applicant and Team Members Roles and Capabilities

- 3.1. Discuss the ability of the team to perform and achieve the goals stated in the SOW. This should include current corporate experience and success in similar projects resulting in

successful technology development and commercialization or technology transfer to commercial product(s). Outline the roles and responsibilities of each participant with respect to the technical approach.

- 3.2. Discuss the role of the Principal Investigator (PI) as project manager enabling the successful completion of the stated goals of the project. The PI is expected to be the project manager, technical lead, and technical point of contact for the project.
- 3.3. Provide a breakdown of key personnel to SOW tasks (manpower matrix). The matrix should illustrate estimated labor hours and labor categories (e.g., project manager, principal investigator, etc.) required for each task and shall provide rolled-up total for each period. The same should also be included for any proposed subcontracting or consulting efforts. Discuss the rationale used to develop estimates for labor hours and categories, and subcontracting/consulting efforts. Cost information is not to be included in the technical proposal volume.
- 3.4. Discuss the availability of facilities and equipment. Identify any major equipment needed for the proposed project which will need to be acquired during the course of the project.

2.4.4. Previous or On-going Related Work

- 4.1. Describe any linkages to current Federal programs (i.e. DOE, DARPA, DOD, NIST, etc.) and any leverage that may be relevant. Demonstrate that the early SSL conceptions have already been pursued.
- 4.2. Explain any corporate commitments that demonstrate involvement in the SSL industry.

STATEMENT OF WORK (APPENDIX A) INSTRUCTIONS

A Statement of Work shall be developed that addresses how the project objectives will be met. The Statement of Work must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. This section shall be restricted to 1-3 pages in length. The Statement of Work may be released to the public by DOE in whole or in part at any time. It is therefore required that it shall not contain proprietary or confidential business information.

TITLE OF WORK TO BE PERFORMED

(Insert the title of work to be performed. Be concise and descriptive. Avoid non-descriptive terms, such as 'novel' or 'innovative')

A. OBJECTIVES

Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.

B. SCOPE OF WORK

This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.

C. TASKS TO BE PERFORMED

Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project. This section provides a brief summary of the planned approach to this project.

PHASE I

Task 1.0 - (Title)

(Description)

Subtask 1.1 (Optional)

(Description)

Task 2.0 - (Title)

PHASE II (Optional)

Task 3.0 - (Title)

D. CRITICAL PATH PROJECT MILESTONES (MILESTONE PLAN/STATUS)

As a part of the approved SOPO, the Recipient will develop a Milestone Plan that will serve as the baseline for tracking performance of the project and will identify critical path project milestones (no less than 2 per calendar year) for the entire project.

During project performance, the Recipient will report the Milestone Status as part of the required quarterly Progress Report as prescribed under Attachment 4, Reporting Requirements Checklist. The Milestone Status will present actual performance in comparison with Milestone Plan, and include:

- (1) the **actual** status and progress of the project,
- (2) specific progress made toward achieving the project's critical path milestones, and,
- (3) any proposed changes in the projects schedule required to complete critical path milestones.

E. DELIVERABLES

The periodic, topical, and final reports shall be submitted in accordance with the attached "Federal Assistance Reporting Checklist" and the instructions accompanying the checklist.

[Note: The Recipient shall provide a list of deliverables other than those identified on the "Federal Assistance Reporting Checklist" that will be delivered. These reports shall also be identified within the text of the Statement of Project Objectives. See the following examples:

1. Task 1.1 - (Report Description)
2. Task 2.2 - (Report Description)]

F. BRIEFINGS/TECHNICAL PRESENTATIONS (If applicable)

The Recipient shall prepare detailed briefings for presentation to the DOE Project Officer at the NETL facility located in Pittsburgh, PA or Morgantown, WV. Briefings shall be given by the Recipient to explain the plans, progress, and results of the technical effort.

The Recipient shall provide and present a technical paper(s) at the DOE/NETL Annual Contractor's Review Meeting to be held at the NETL facility located in Pittsburgh, PA or Morgantown, WV; or other location specified by the DOE Project Officer.

The Recipient shall provide and present a technical paper(s) at the DOE/NETL Peer Review Meeting to be held at DOE Headquarters in Washington D.C.; or other location specified by the DOE Project Officer.

SECTION V: EVALUATION AND SELECTION

1.0 INITIAL REVIEW CRITERIA

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the Research Call has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the Research Call.

2.0 MERIT REVIEW CRITERIA

Proposals submitted in response to this Research Call will be evaluated and scored in accordance with the criteria and weights listed below:

2.1 TECHNICAL APPROACH (CRITERION 1) – 40%

- Validity of the proposed approach, the likelihood of success, and the scientific merit of the key technology issues addressed.
- Comprehensiveness of the proposed technical milestones for each interval of the proposed effort with special emphasis on the descriptive, qualitative and especially quantitative, where applicable, milestone aspects. Technical realism and likelihood of success of the proposed technical milestones for each interval of the effort.
- Thoroughness and feasibility of the proposed Statement of Work (SOW) and the anticipated outcomes and results.
- The degree to which the proposed technical approach is innovative and its relevance to the stated objectives.

2.2 TECHNOLOGY “VALUE” (CRITERION 2) – 30%

- The extent to which the proposed project will contribute to the eventual achievement of DOE’s SSL mission and/or goal.
- The extent to which the proposed approach will surpass current performance levels in solid-state lighting.
- The extent to which the proposed approach will contribute to multiple SSL technologies or how it may positively impact other DOE energy efficiency objectives (crosscutting).
- The importance of the proposed work relative to the SSL mission and its potential impact on eventual SSL products.

- Feasibility of the proposed work allowing DOE to achieve the SSL goals earlier than planned.
- 2.3 APPLICANT AND TEAM MEMBERS ROLES AND CAPABILITIES (CRITERION 3) – 20%
- Adequacy of the proposed team’s abilities to achieve the goals proposed in the SOW; the level of professional and academic credentials of the proposed team members.
 - Demonstrated abilities to successfully perform project management functions on projects similar in complexity and scope and reasonableness of PI’s time allotted to fulfill project management requirements.
 - Reasonableness of time allocations outlined in the manpower matrix; effectiveness of the proposed roles and responsibilities of outlined personnel in order to accomplish the SOW.
 - The adequacy (quality, availability, and appropriateness) of facilities and equipment to accommodate the proposed project.
- 2.4 PREVIOUS OR ON-GOING RELATED WORK (CRITERION 4) – 10%
- Linkages to current Federal Programs (i.e., DOE, DARPA, DOD, NIST, etc.) and any leverage that may be relevant.
 - Potential benefits of the applicant’s corporate commitments or linkages to the SSL industry.

3.0 OTHER SELECTION FACTORS

- The selection official will consider the following program policy factors in the selection process:

These factors, while not indicators of the Application's merit, e.g., technical excellence, cost, Applicant's ability, etc., may be essential to the process of selecting the application(s) that, individually or collectively, will best achieve the program objectives. Such factors are often beyond the control of the Applicant. Applicants should recognize that some very good applications may not receive an award because they do not fit within a mix of projects which maximizes the probability of achieving the DOE's overall R&D objectives. Therefore, the following Program Policy Factors may be used by the Selection Official to assist in determining which of the ranked application(s) shall receive DOE funding support.

1. It may be desirable to select for award a group of projects which represents a diversity of technical approaches and methods;
2. It may be desirable to support complementary and/or duplicative efforts or projects, which, when taken together, will best achieve the research goals and objectives;
3. It may be desirable to select different kinds and sizes of organizations in order to provide a balanced programmatic effort and a variety of different technical perspectives;

4. It may be desirable, because of the nature of the energy source, the type of projects envisioned, or limitations of past efforts, to select a group of projects with a broad or specific geographic distribution.
5. It may be desirable to select project(s) of less technical merit than other project(s) if such a selection will optimize use of available funds by allowing more projects to be supported and not be detrimental to the overall objectives of the program.
6. It may be desirable to select project(s) for award based on the Applicant's past Federal Award performance with respect to its potential effect on accomplishment of portfolio goals.

The above factors will be independently considered by the Selection Official in determining the optimum mix of applications that will be selected for support. These policy factors will provide the Selection Official with the capability of developing, from the competitive Research Call, a broad involvement of organizations and organizational ideas, which will both enhance the overall technology research effort and upgrade the program content to meet the goals of the DOE.